Features

- Surface Mount Limiter in 8 mm x 5 mm x 2.5 mm Package
- Incorporates PIN Limiter & Schottky Diodes
- DC Blocks & DC Return
- Higher Average Power Handling than Plastic: 50 W CW Power
- Lower Insertion Loss: 0.8 dB
- Lower Flat Leakage Power: 17 dB
- RoHS* Compliant

Description

The LM102202-H-C-301 surface mount silicon PIN diode limiters is manufactured using proven hybrid manufacturing process incorporating PIN diodes and passive devices integrated within a ceramic substrate. This low profile, compact, surface mount component, (8 mm L x 5 mm W x 2.5 mm H) offers superior low and high signal performance to comparable MMIC devices in QFN packages. The limiter modules are designed to optimize small signal insertion loss, noise figure and high signal flat leakage performance in a compact, surface mount package. Using PIN diodes with lower thermal resistance (<10°C/W), and a De-coupled Schottky detector network as a current source, RF CW incident power levels of 47 dBm and RF peak incident power levels of 53 dBm @ 20 μs RF pulse width, 1% duty cycle are very achievable. In addition, this design concept provides lower flat leakage power (<17 dBm) and lower spike leakage energy (<0.5 Ergs) for superior LNA protection.

This LM102202-H-C-301 limiter is ideal for octave band radar applications, requiring high volume, surface mount, solder re-flow manufacturing. These products are durable, reliable, and capable of meeting all military, commercial, and industrial environments. These devices are RoHS compliant and are available in tube or tape-reel.

PIN Diode Limiter

Electrical Specifications: Freq.: 0.8 - 2.5 GHz, $T_A = +25^\circ C$, $Z_0 = 50 \, \Omega$

### Absolute Maximum Ratings\(^1,2\)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF CW Incident Power @ +85°C, Source &amp; Load VSWR &lt;1.2:1</td>
<td>47 dBm</td>
</tr>
<tr>
<td>RF Peak Incident Power @ +85°C, Source &amp; Load VSWR &lt;1.2:1</td>
<td>53 dBm</td>
</tr>
<tr>
<td>Insertion Loss Rate of Change with Operating Temperature</td>
<td>$\leq -0.0025 , \text{dB} / \degree C$</td>
</tr>
<tr>
<td>Assembly Temperature</td>
<td>260°C for 10 seconds</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>$+175^\circ C$</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>$-65^\circ C$ to $+125^\circ C$</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>$-65^\circ C$ to $+150^\circ C$</td>
</tr>
</tbody>
</table>

1. Exceeding any one or combination of these limits may cause permanent damage to this device.
2. MACOM does not recommend sustained operation near these survivability limits.

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For further information and support please visit:
https://www.macom.com/support
Handling Procedures
Please observe the following precautions to avoid damage:

Static and Moisture Sensitivity
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 0 (HBM) devices.

The moisture sensitivity level rating for this device is MSL 1.

Environmental Capabilities
This limiter is capable of meeting the environmental requirements of MIL-STD-750 and MIL-STD-202.

Thermal Grounding Caution
Product engineering dictates that the LM family of high power limiters require proper heat sinking for high power applications >40 dBm (10 W). MACOM recommends using the part number PNMN13881 heat sink block which was developed for LM family.

Assembly Instructions
The LM102202-H-C-301 limiters are capable of being placed onto circuit boards with pick and place manufacturing equipment from tube or tape & reel dispensing. The devices are attached to the circuit board using conventional solder re-flow or wave soldering procedures with RoHS type or Sn 60 / Pb 40 type solders per Table 1 & Graph 1 Time-Temperature recommended profile.

RF Circuit Solder Footprint, case style 301 (CS301)

Recommended RF circuit is Rogers R04350B, 10 mils thick.
### Table 1: Time-Temperature Profile for Sn 60 / Pb 40 or RoHS Type Solders

<table>
<thead>
<tr>
<th>Profile Feature</th>
<th>Sn-Pb Eutectic Assembly</th>
<th>Pb-Free Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average ramp-up rate (TL to TP)</td>
<td>3°C/second maximum</td>
<td>3°C/second maximum</td>
</tr>
<tr>
<td>Preheat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Temperature Minimum (TSMIN)</td>
<td>100°C</td>
<td>150°C</td>
</tr>
<tr>
<td>- Temperature Maximum (TSMAX)</td>
<td>150°C</td>
<td>200°C</td>
</tr>
<tr>
<td>- Time (Minimum to maximum) (ts)</td>
<td>60-120 seconds</td>
<td>60-180 seconds</td>
</tr>
<tr>
<td>TSMAX to TL - Ramp-up Rate</td>
<td>—</td>
<td>3°C/second maximum</td>
</tr>
<tr>
<td>Time Maintained above:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Temperature (TL)</td>
<td>183°C</td>
<td>217°C</td>
</tr>
<tr>
<td>- Time (TL)</td>
<td>60-150 seconds</td>
<td>60-150 seconds</td>
</tr>
<tr>
<td>Peak Temperature (TP)</td>
<td>225 +0 / -5°C</td>
<td>245 +0 / -5°C</td>
</tr>
<tr>
<td>Time within 5°C of actual Peak Temper-</td>
<td>10-30 seconds</td>
<td>20-40 seconds</td>
</tr>
<tr>
<td>ture (TP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramp-down Rate</td>
<td>6°C/second maximum</td>
<td>6°C/second maximum</td>
</tr>
<tr>
<td>Time 25°C to Peak Temperature</td>
<td>6 minutes maximum</td>
<td>8 minutes maximum</td>
</tr>
</tbody>
</table>

### Graph 1: Solder Re-Flow Time-Temperature Function

![Graph 1: Solder Re-Flow Time-Temperature Function](image-url)
The hatched metal area on circuit side of device is RF and DC grounded.
Dimensions are in inches (mm)
Substrate Material: 20 mil thick Alumina Nitride (ALN)
RF Cover: Black Ceramic
Top Side and Backside Metallization: 100 µ IN. typical plated over Ti-Pd.
PIN Diode Limiter

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